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# **A National Web Conference on Optimizing the Presentation and Visualization of Health Data for Patients and Providers**

## **Presented by:**

Brian J. Zikmund-Fisher, Ph.D.

Genevieve Melton-Meaux, M.D., Ph.D.

## **Moderated by:**

Chun-Ju (Janey) Hsiao, Ph.D.

Agency for Healthcare Research and Quality

May 30, 2017



# Agenda

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- Welcome and Introductions
- Presentations
- Q&A Session With Presenters
- Instructions for Obtaining CME Credits

**Note:** After today's Webinar, a copy of the slides will be emailed to all participants.



# AHRQ's Mission

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To produce evidence to make health care safer, higher quality, more accessible, equitable, and affordable, and work within the U.S. Department of Health and Human Services and with other partners to make sure that the evidence is understood and used.



# How AHRQ Makes a Difference

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- AHRQ **invests in research and evidence** to understand how to make health care safer and improve quality.
- AHRQ creates materials to **teach and train** health care systems and professionals to **catalyze** improvements in care.
- AHRQ **generates measures and data** used to track and improve performance and evaluate progress of the U.S. health system.

# Presenter and Moderator Disclosures

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The following presenters and moderator have no financial interests to disclose:

- Brian J. Zikmund-Fisher, Ph.D.
- Chun-Ju (Janey) Hsiao, Ph.D.

Genevieve Melton-Meaux, M.D., Ph.D. would like to disclose that her spouse works for Abbott Medical. Conflict of interest was resolved through peer review of content.

This continuing education activity is managed and accredited by the Professional Education Services Group (PESG), in cooperation with AHRQ, AFYA, and RTI.

PESG, AHRQ, AFYA, and RTI staff have no financial interests to disclose.

Commercial support was not received for this activity.



# How to Submit a Question

- At any time during the presentation, type your question into the “Q&A” section of your WebEx Q&A panel.
- Please address your questions to “All Panelists” in the drop-down menu.
- Select “Send” to submit your question to the moderator.
- Questions will be read aloud by the moderator.



The screenshot shows the WebEx interface with three tabs: 'Participants', 'Chat', and 'Q&A'. The 'Q&A' tab is selected. Below the tabs, there is a 'Participants' section with a list of participants. Below that, there is a 'Q&A' section with a text input field and a 'Send' button. A red arrow points to the 'Ask:' dropdown menu, which is currently set to 'All Panelists'.

# Learning Objectives

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At the conclusion of this activity, the participant will be able to do the following:

- 1) Describe the challenges patients face in understanding medical test data and present evidence-based methods to overcome these barriers and help patients make sense of the data, manage their health, and make choices about their care.
- 2) Describe findings around EHR navigator usage and clinical note organization with usability studies to support improved provider workflow.



# Getting Beyond “I’ll Tell You When to Worry”:

*Designing Intuitively Meaningful Test Result Displays*

**Brian J. Zikmund-Fisher, Ph.D.**

**University of Michigan**

Department of Health Behavior & Health Education

Department of Internal Medicine

Center for Bioethics & Social Sciences in Medicine

Health Informatics Program

[@bzikmundfisher](https://twitter.com/bzikmundfisher)





# A Story

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Total Bilirubin:  
1.4 mg/dL



# A Story

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“Don’t worry!”

“I’ll tell you  
when to worry.”

# Information

## Evaluability

Hsee, 1996, *Organizational Behavior & Human Decision Processes*.

Hsee, et al., 1999, *Psychological Bulletin*.

Zikmund-Fisher, et al., 2004, *Medical Decision Making*.

# Decision Making

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- Hard-to-evaluate data require reference standards to be meaningful.
  - *Such data are generally ignored unless comparative data are provided.*

Hsee, 1996, *Organizational Behavior & Human Decision Processes*.

Hsee, et al., 1999, *Psychological Bulletin*.

Zikmund-Fisher, et al., 2004, *Medical Decision Making*.



# Patient Portals

---

- Increasing direct access to test results



# Can Patients Use This?

## Component Results

Component	Your Value	Standard Range	Units
WBC Count	5.2	4.0 - 10.0	K/MM3
Hemoglobin	15.8	13.5 - 17.0	g/dl
Hematocrit	44.7	40.0 - 50.0	%
Platelet Count	145	150 - 400	K/MM3
RBC Count	4.71	4.40 - 5.70	M/MM3
Mean Corpuscular Volume	94.9	79.0 - 99.0	fl
Mean Corpuscular Hgb	33.5	27.0 - 32.0	pg
Mean Corpuscular Hgb Conc.	35.3	32.0 - 35.0	G/DL
Red Cell Distribution Width	11.7	11.5 - 15.0	%
Mean Platelet Volume	11.1	9.0 - 12.2	fl

# Patient Portals

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- Increasing direct access to test results.
- However, the value of that data comes in its meaning.
  - Recognizing out-of-range values is the first, essential step to meaningful use.

# What Is Out of Range?

## Component Results

Component	Your Value	Standard Range	Units
WBC Count	5.2	4.0 - 10.0	K/MM3
Hemoglobin	15.8	13.5 - 17.0	g/dl
Hematocrit	44.7	40.0 - 50.0	%
Platelet Count	145	150 - 400	K/MM3
RBC Count	4.71	4.40 - 5.70	M/MM3
Mean Corpuscular Volume	94.9	79.0 - 99.0	fl
Mean Corpuscular Hgb	33.5	27.0 - 32.0	pg
Mean Corpuscular Hgb Conc.	35.3	32.0 - 35.0	G/DL
Red Cell Distribution Width	11.7	11.5 - 15.0	%
Mean Platelet Volume	11.1	9.0 - 12.2	fl



# Can People Identify Test Results as Out of Range?

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- Type 2 diabetes scenario
  - Task: To determine if Hemoglobin A1c was outside the Standard Range
- 1817 adults age 40-70
  - Demographically diverse Internet panel
  - Measured health literacy and numeracy

# Test Results

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- Participants received tables of:
  - CBC counts
  - CBC differential %s
  - Hemoglobin A1c
  - Renal panel
- Tables included standard range *but did not include high/low flags.*

## Complete Blood Count

Component	Your Value	Standard Range	Units
WBC Count	5.2	4.0-10.0	K/MM3
Hemoglobin	15.8	13.5-17.0	g/dl
Hematocrit	44.7	40.0-50.0	%
Platelet Count	165	150-400	K/MM3
RBC Count	4.71	4.40-5.70	M/MM3
Mean Corpuscular Volume	94.9	79.0-99.0	fl
Mean Corpuscular Hgb	31.5	27.0-32.0	pg
Mean Corpuscular Hgb Conc.	34.5	32.0-35.0	G/DL
Red Cell Distribution Width	11.7	11.5-15.0	%
Mean Platelet Volume	11.1	9.0-12.2	fl

## Auto Diff

Component	Your Value	Standard Range	Units
Neutrophil % (Sysmex)	54.7	36.0-71.0	%
Lymphocyte % (Sysmex)	34.0	20.0-50.0	%
Monocyte % (Sysmex)	9.3	6.0-13.0	%
Eosinophil % (Sysmex)	1.4	0.0-6.0	%
Basophil % (Sysmex)	0.4	0.0-1.0	%
Immature Granulocyte % (Sysmex)	0.2	0.0-1.0	%

## Absolute Counts

Component	Your Value	Standard Range	Units
Absolute Neutrophil Count	2.8	1.5-7.2	K/MM3
Absolute Lymphocyte Count	1.8	1.2-4.0	K/MM3
Absolute Monocyte Count	0.5	0.1-1.1	K/MM3
Absolute Eosinophil Count	0.1	0.0-0.5	K/MM3
Absolute Basophil Count	0.0	0.0-0.2	K/MM3
Absolute Early Gran Count	0.0	0.0-0.1	K/MM3

## Hemoglobin A1c

Component	Your Value	Standard Range	Units
Hemoglobin A1c	8.4	3.8-6.4	%

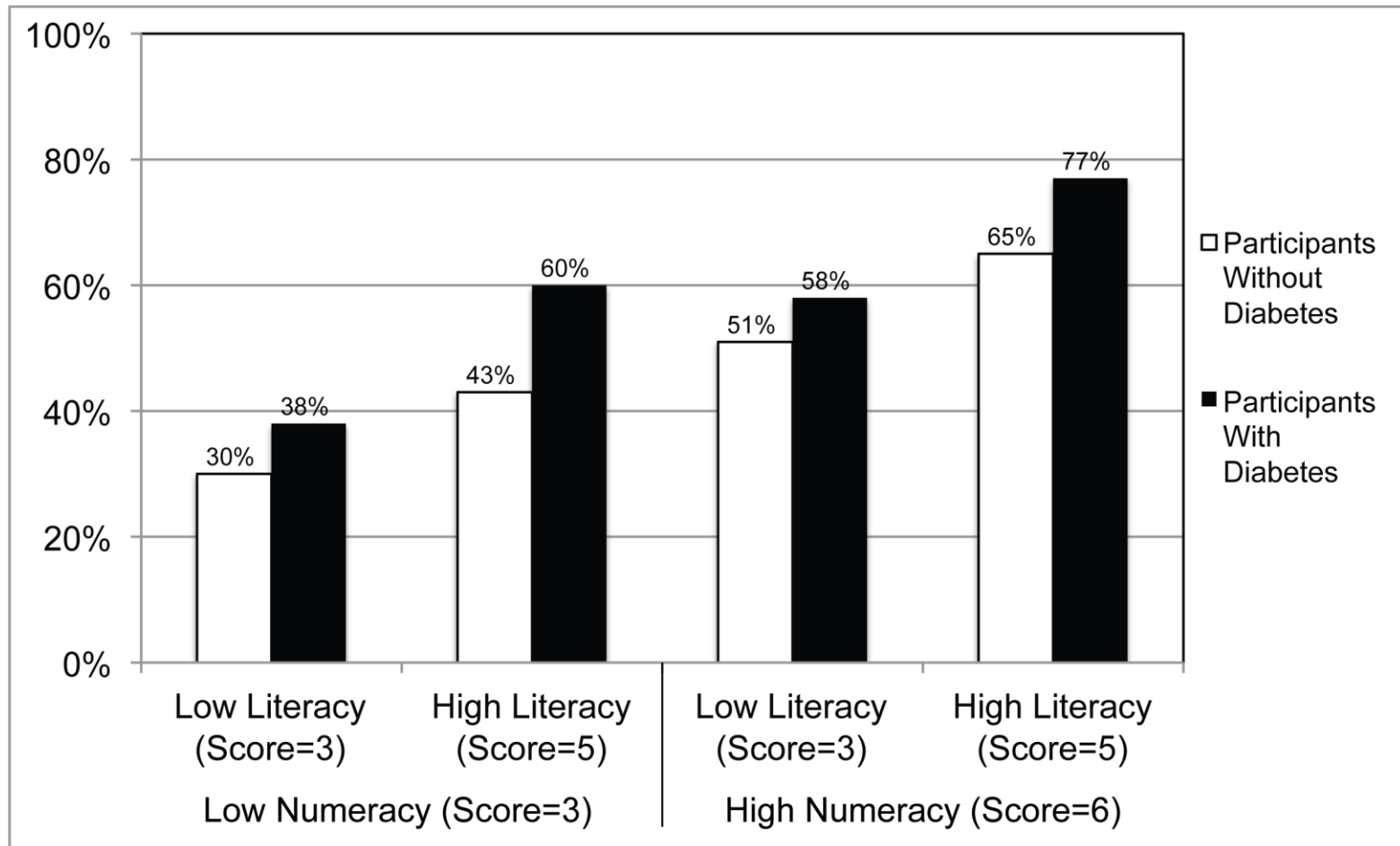
## Basic Metabolic Panel

Component	Your Value	Standard Range	Units
Glucose	125	70-140	mg/dL
Urea Nitrogen	10	8.0-20.0	mg/dL
Creatinine	1.0	0.7-1.3	mg/dL
Calcium	8.7	8.6-10.3	mg/dL
Sodium	143	136-146	mmol/L
Potassium	4.9	3.5-5.0	mmol/L
Chloride	100	98-108	mmol/L
CO2	24	22-34	mmol/L

Zikmund-Fisher BJ, Exe NL, Witteman HO. Numeracy and literacy independently predict patients' ability to identify out-of-range test results. *Journal of Medical Internet Research* 2014;16(8):e187.



# Effects of Numeracy and Literacy



Zikmund-Fisher BJ, Exe NL, Witteman HO. Numeracy and literacy independently predict patients' ability to identify out-of-range test results. *Journal of Medical Internet Research*, 2014.

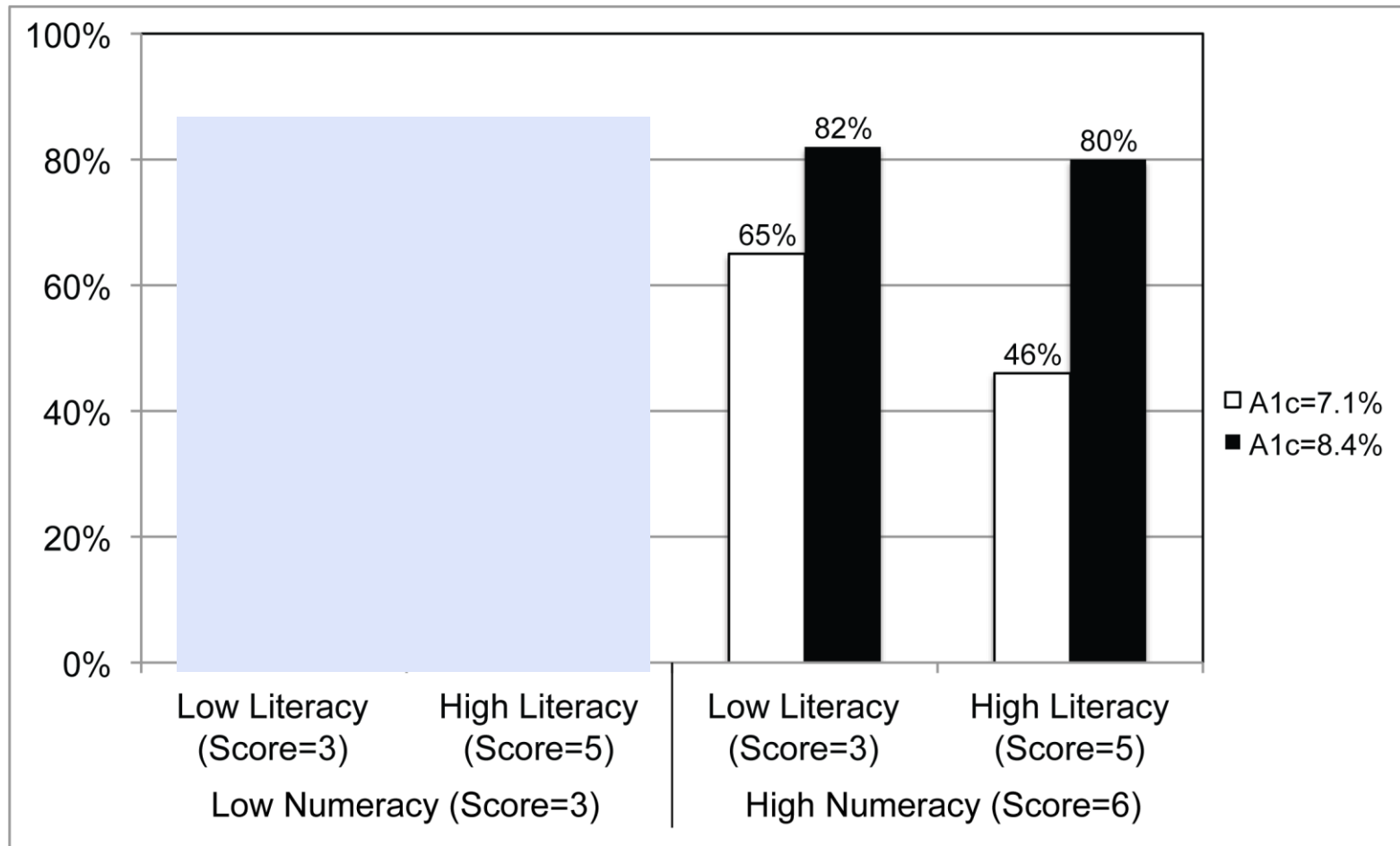
# Experimental Design

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- A1c level
  - 7.1%
  - 8.4%



# Estimated Likelihood of Calling a Doctor



Zikmund-Fisher BJ, Exe NL, Witteman HO. Numeracy and literacy independently predict patients' ability to identify out-of-range test results. *Journal of Medical Internet Research*, 2014.

# Improving Test Result Displays

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- Collaborators:
  - Angela Fagerlin (U. Utah)
  - Aaron M. Scherer (U. Iowa)
  - Holly O. Witteman (U. Laval)
  - Jacob Solomon (U. Michigan)
  - Beth A. Tarini (U. Iowa)
  - Nicole L. Exe (U. Michigan)
- Funding: AHRQ (R01 HS021681)



# Tables

**Table:**

Test	Your Result	Standard Range	Units
Platelet Count (PLT)	135	150-400	$\times 10^9/\text{L}$

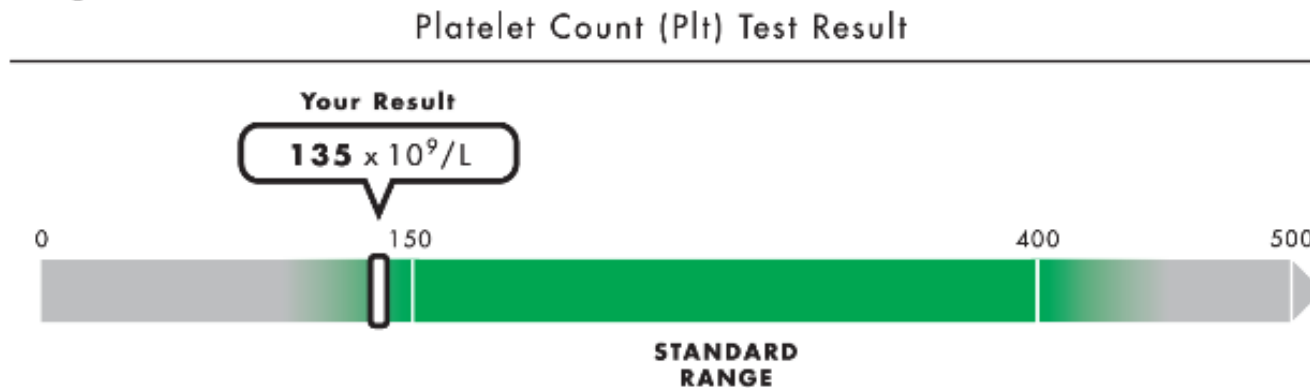


# Table vs. Number Line

**Table:**

Test	Your Result	Standard Range	Units
Platelet Count (PLT)	135	150-400	$\times 10^9/L$

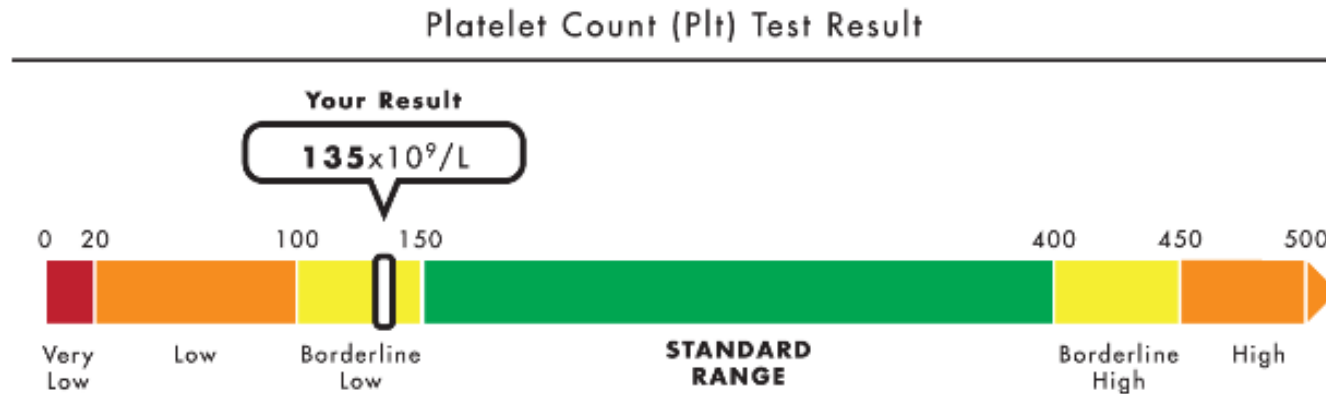
**Simple Line:**



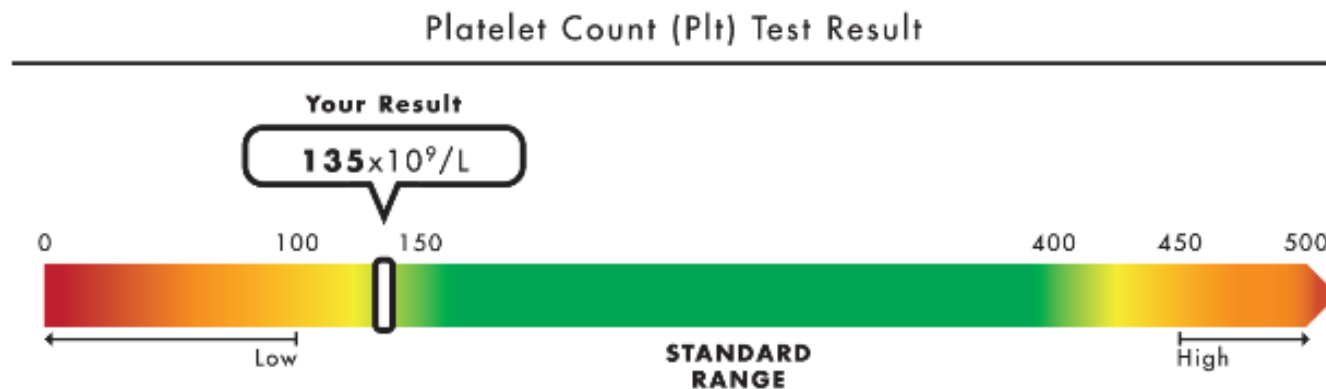


# Lines With More Meaning

## Block Line:



## Gradient Line:



# Does Format Affect Sensitivity to Test Results?

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- Medication management scenario
  - Viewing online the results of multiple blood tests ordered after a doctor's visit
- 1620 adults age 18+
  - Demographically diverse Internet panel

# Design

---

- Display format (*between subject*)
- Test type (*within subject*)
  - Platelet count
  - Alanine Aminotransferase (ALT)
  - Serum Creatinine

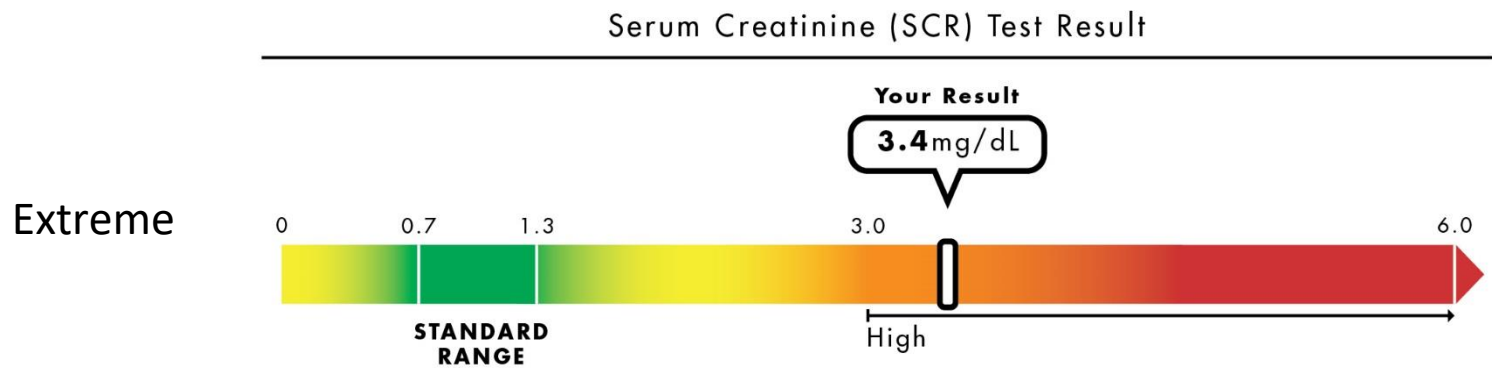
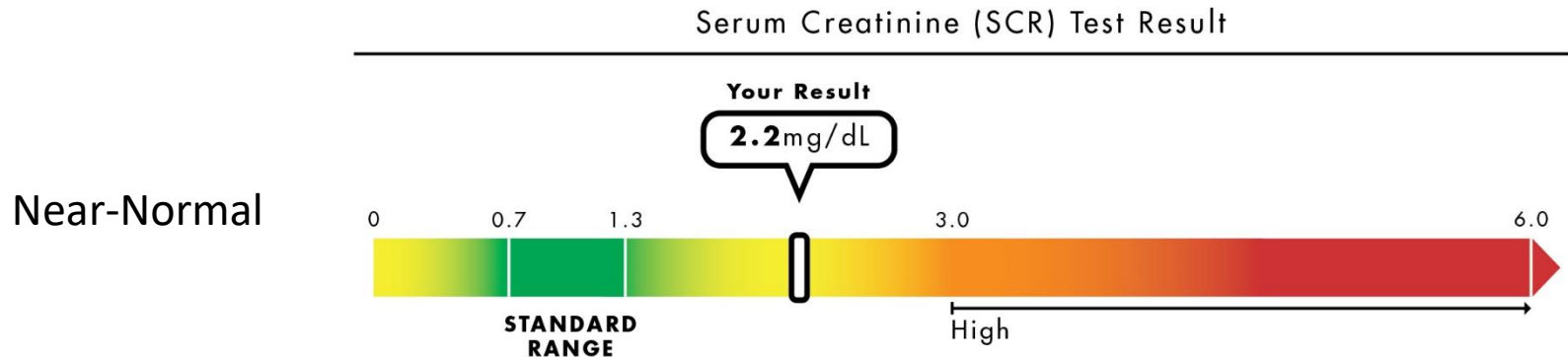
# Design

---

- Display format (*between subject*)
- Test type (*within subject*)
- Test result (*within subject*)
  - Near-normal (minimal incremental risk)
  - Extreme (substantial risk)



# Comparing Test Results





# % With No Difference in Perceived Urgency

	Platelets (135 vs 25 x10 <sup>9</sup> /L)	ALT (80 vs 360 U/L)	Creatinine (2.2 vs 3.4 mg/dl)
Table	26.5	56.3	43.7

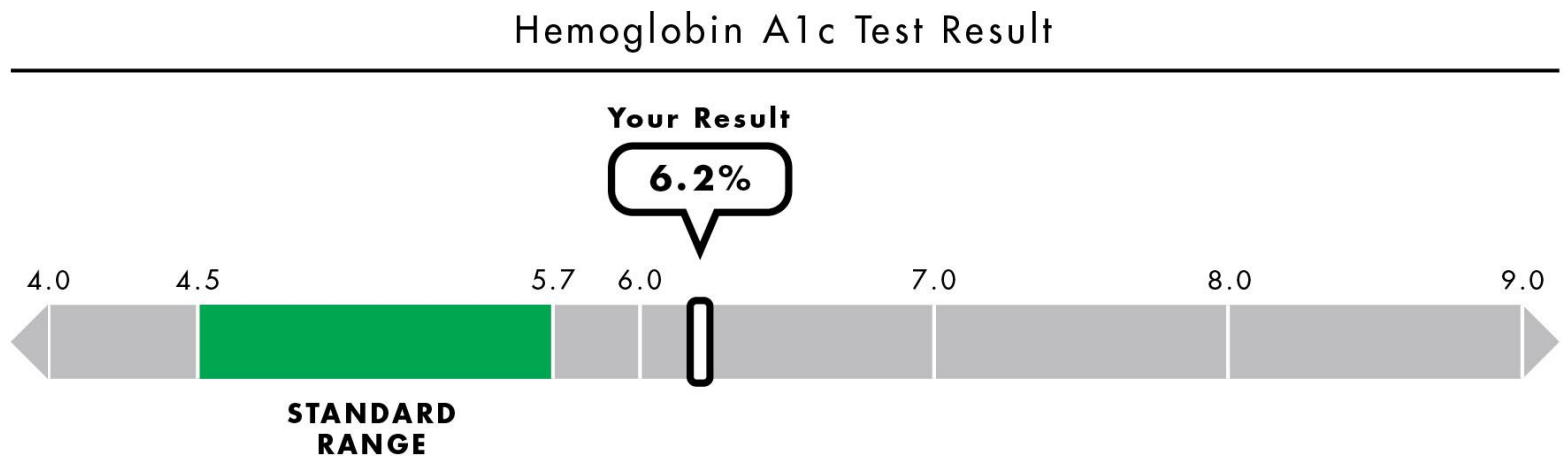
# % With No Difference in Perceived Urgency

	Platelets (135 vs 25 x10 <sup>9</sup> /L)	ALT (80 vs 360 U/L)	Creatinine (2.2 vs 3.4 mg/dl)
Table	26.5	56.3	43.7
Simple Line	17.5	21.3	27.7
Block Line	19.0	20.2	28.7
Gradient Line	15.8	14.8	24.0





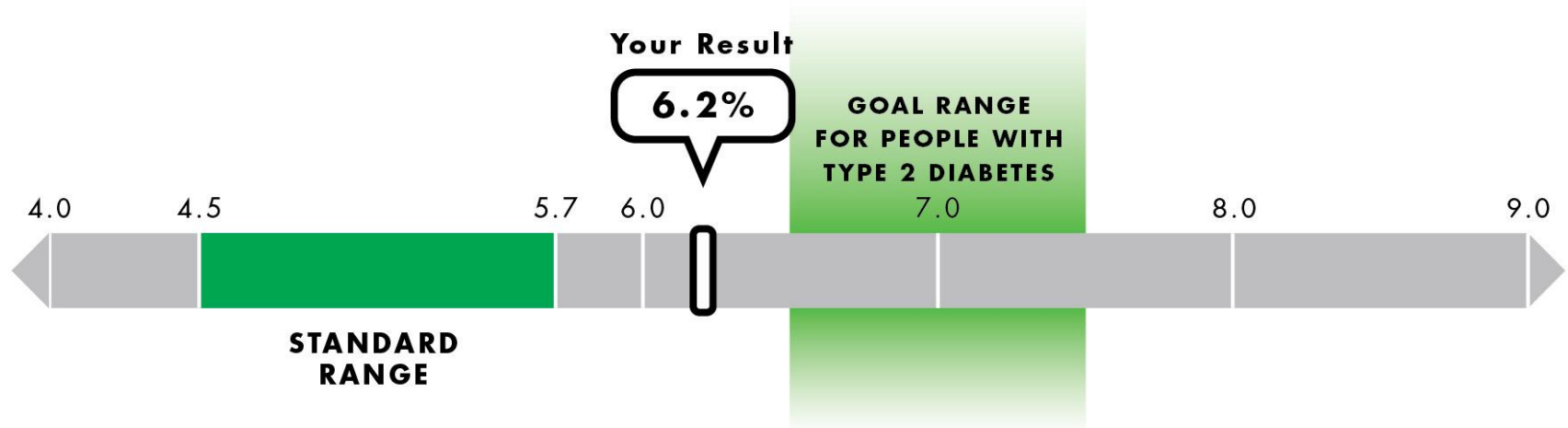
# Ongoing Design Research





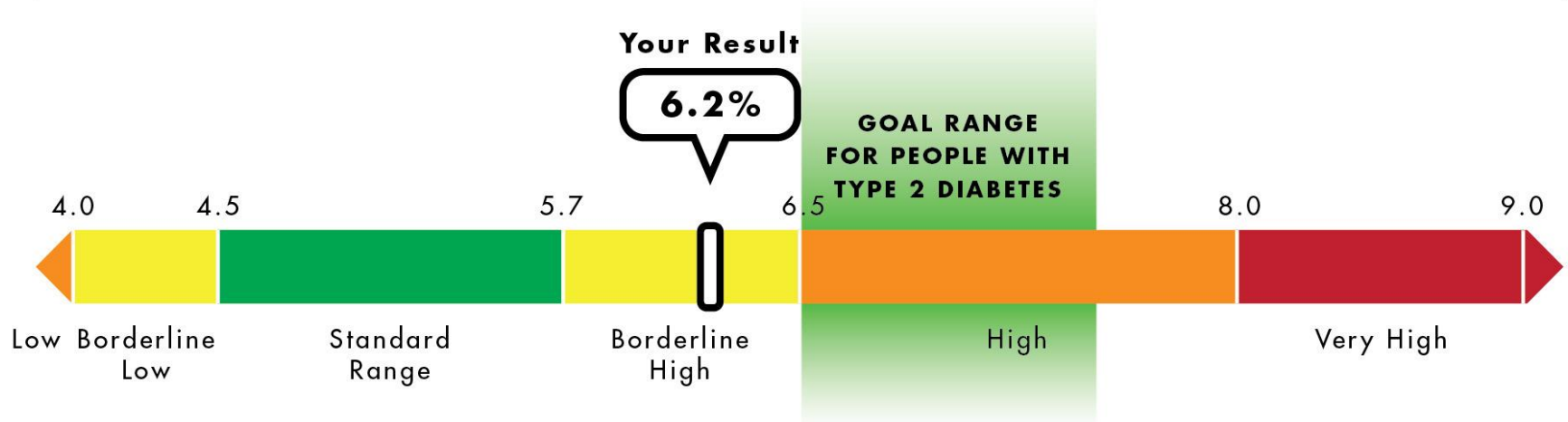
# Ongoing Design Research

## Hemoglobin A1c Test Result



# Ongoing Design Research

## Hemoglobin A1c Test Result

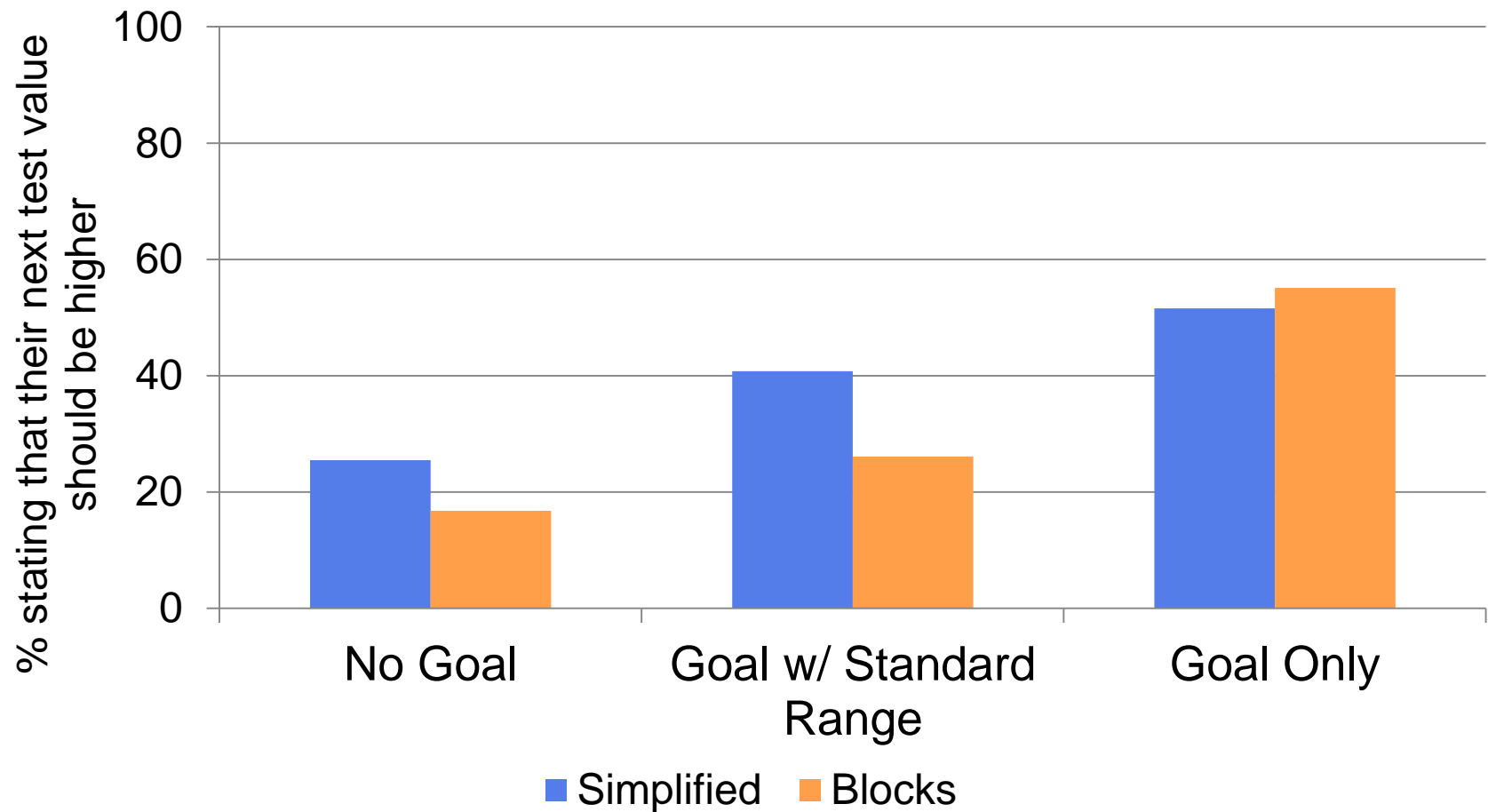


# Ongoing Design Research

## Hemoglobin A1c Test Result



# % With A1c=6.2% Wanting Next Result to Be Higher



# The Problem

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- How to get people to react more to extremely out-of-range values



# The Problem

---

- How to get people to react more to extremely out-of-range values
- How to get people to react *LESS* to *mildly out-of-range values*
  - Often not clinically concerning
  - However, may provoke patient anxiety or calls



# Early Version

## Alanine Aminotransferase (ALT) Test Result







# Refined Simple Design

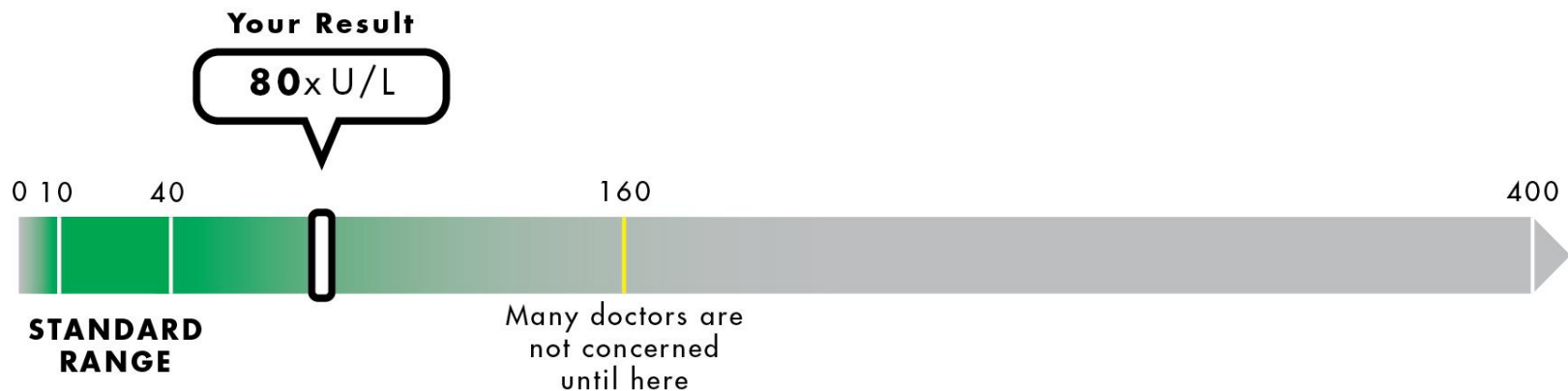
## Alanine Aminotransferase (ALT) Test Result





# Harm Anchor Design

## Alanine Aminotransferase (ALT) Test Result





# Three Tests

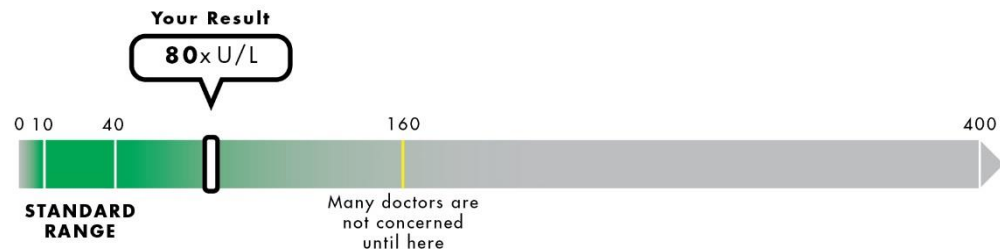
## Platelet Count (PLT)

### Platelet Count (PLT) Test Result



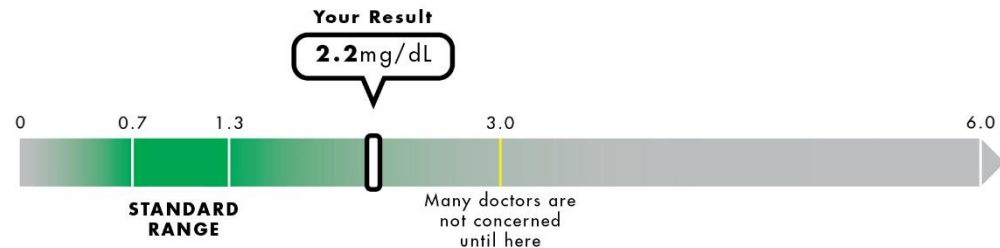
## Alanine Aminotransferase (ALT)

### Alanine Aminotransferase (ALT) Test Result



## Serum Creatinine (SCR)

### Serum Creatinine (SCR) Test Result



# Can Harm Anchors Change Affect Test Interpretation?

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- Medication management scenario
- 794 U.S. adults
  - Same demographically diverse online panel



# Design

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- Format (*between subject*)
  - Simple design vs. harm anchors
- Test results (*within subject*)
  - Initially values “near” to standard range
    - PLT=135, ALT=80, SCR=2.2
  - Repeat with “far” / extreme values
    - PLT=25, ALT=360, SCR=3.4



# Harm Anchors Reduced Alarm Re: Near Values...

	Simple Design	Harm Anchors	P-value
PLT = 135 x10 <sup>9</sup>	3.72	3.69	.77
ALT = 80 U/L	4.00	3.11	<.001
SCR = 2.2 mg/dl	4.11	3.55	<.001

“How alarming does this [TEST NAME] result feel to you?”  
Response scale: 1 “Not at all” – 6 “Very”

# ...But Did Not Impact Reactions to Extreme Values

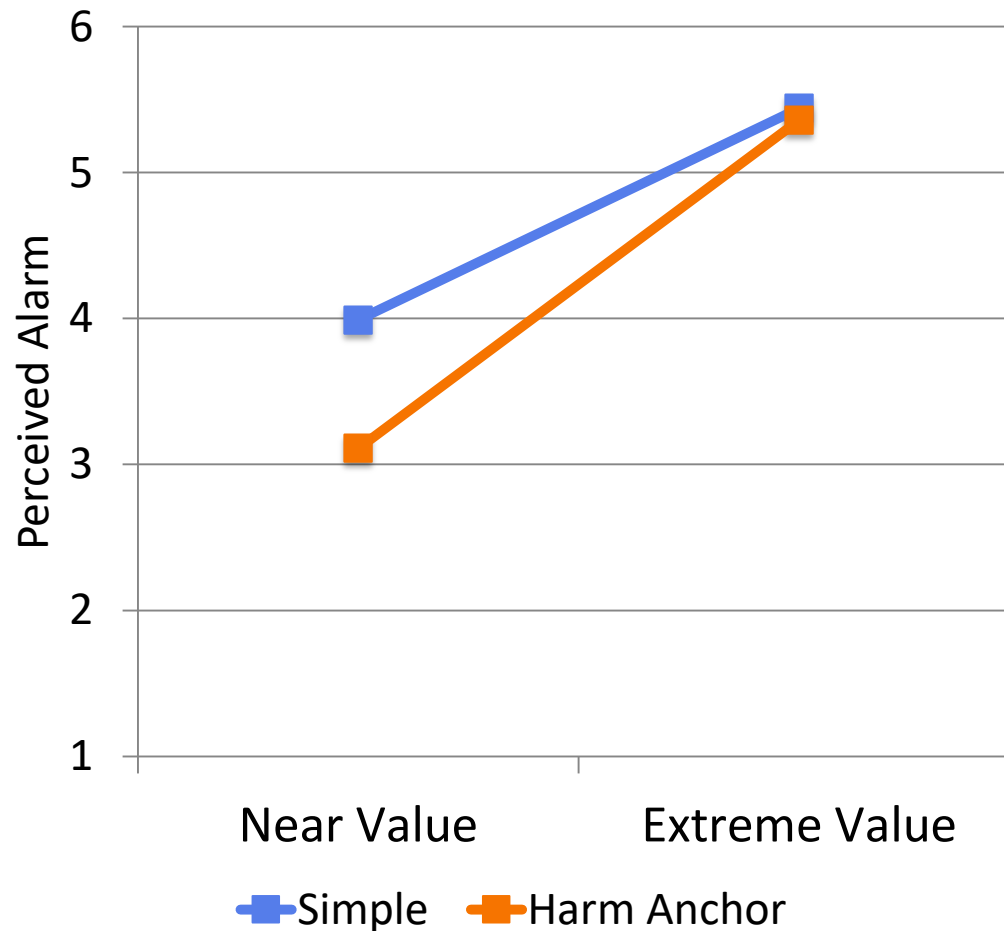
	Simple Design	Harm Anchors	P-value
PLT = 25 x10 <sup>9</sup> /L	5.28	5.09	.06
ALT = 360 U/L	5.45	5.36	.26
SCR = 3.4 mg/dl	5.81	5.73	.33

“How alarming does this [TEST NAME] result feel to you?”

Response scale: 1 “Not at all” – 6 “Very”



# Increased Sensitivity







# Desire to Contact MD Urgently

- Harm anchors reduced respondents' desire to contact a doctor urgently or go to the hospital.

	Simple Design	Harm Anchors	P-value
PLT = $135 \times 10^9$	50.0%	44.2%	.10
ALT = 80 U/L	55.8%	34.7%	<.001
SCR = 2.2 mg/dl	56.7%	35.2%	<.001

# What Do We Want Patients Comparing Themselves to?

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Standard  
Range

vs.

Harm  
Anchor

# What Do We Want Patients Comparing Themselves to?

---

Standard  
Range

vs.

Harm  
Anchor

*What's  
Normal*

vs.

*What's  
Dangerous*

# Challenges

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- Selection of
  - Scale endpoints
  - Category boundaries
  - Action / harm thresholds
- Acceptance of responsibility

Providing the *right number*  
does NOT guarantee  
*the right message.*



# Contact Information

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Brian J. Zikmund-Fisher

[bzikmund@umich.edu](mailto:bzikmund@umich.edu)



# Supporting Providers With EHR Navigators and Clinical Note Organization

Genevieve Melton-Meaux, M.D., Ph.D.

Associate Professor of Surgery and Health Informatics Core  
Faculty – University of Minnesota

Chief Health Information Officer – Fairview Health Services and  
University of Minnesota Physicians



# Learning Objectives

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- At the end of this presentation, the learner should be able to do the following:
  - Understand the importance of usability testing for EHR functionality, like navigators and balancing standardization with flexibility for optimal usage.
  - Appreciate how the order of sections within electronic progress notes impacts the usability and experience of reviewing patient notes.



# Background

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- EHR systems are increasingly ubiquitous.
  - Healthcare systems progressively leverage EHRs to help provide more reliable care.
  - Value-based programs and at-risk contracts.
  - Meaningful Use (MU)/Advancing Care Information.
- User satisfaction with EHRs remains low.
  - Poorly designed user interfaces.
  - Increased focus needed on understanding human factors, workflow processes, and usability principles.

# “Usability Testing of Two Ambulatory EHR Navigators”

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[Applied Clinical Informatics](#). 2016 Jun 15;7(2):502-15. doi: 10.4338/ACI-2015-10-RA-0129. eCollection 2016.

Gretchen Hultman MPH<sup>1</sup>, Jenna Marquard PhD<sup>4</sup>, Elliot Arsoniadis MD<sup>1,2</sup>, Pamela Mink J. PhD, MPH<sup>5</sup>, Rubina Rizvi MBBS, MS<sup>1</sup>, Tim Ramer, MD<sup>3</sup>, Saif Khairat, PhD,<sup>5</sup> Keri Fickau,<sup>6</sup> Genevieve B. Melton MD, PhD<sup>1,2,6</sup>

<sup>1</sup>Institute for Health Informatics, <sup>2</sup>Department of Surgery, and <sup>3</sup>Department of Family Medicine; University of Minnesota, Minneapolis, MN<sup>4</sup> College of Engineering, University of Massachusetts Amherst, Amherst, MA  
<sup>5</sup>Division of Applied Research, Allina Health, Minneapolis, MN Carolina Informatics Program, University of North Carolina, Chapel Hill, NC <sup>6</sup>Fairview Health Services, Minneapolis, MN

No disclosures

# Our Context

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- Ambulatory clinics at a tertiary care medical center upgraded commercial EHR.
- Clinic staff identified several issues with existing navigator.
  - Options and functionality had been added to the navigator without removing other options.
  - Long list that required extensive scrolling.
  - Included several infrequently used options.
- Resulted in an effort to redesign the navigator with clinician feedback.

User-Centered Design With Usability Testing

# Study Objectives

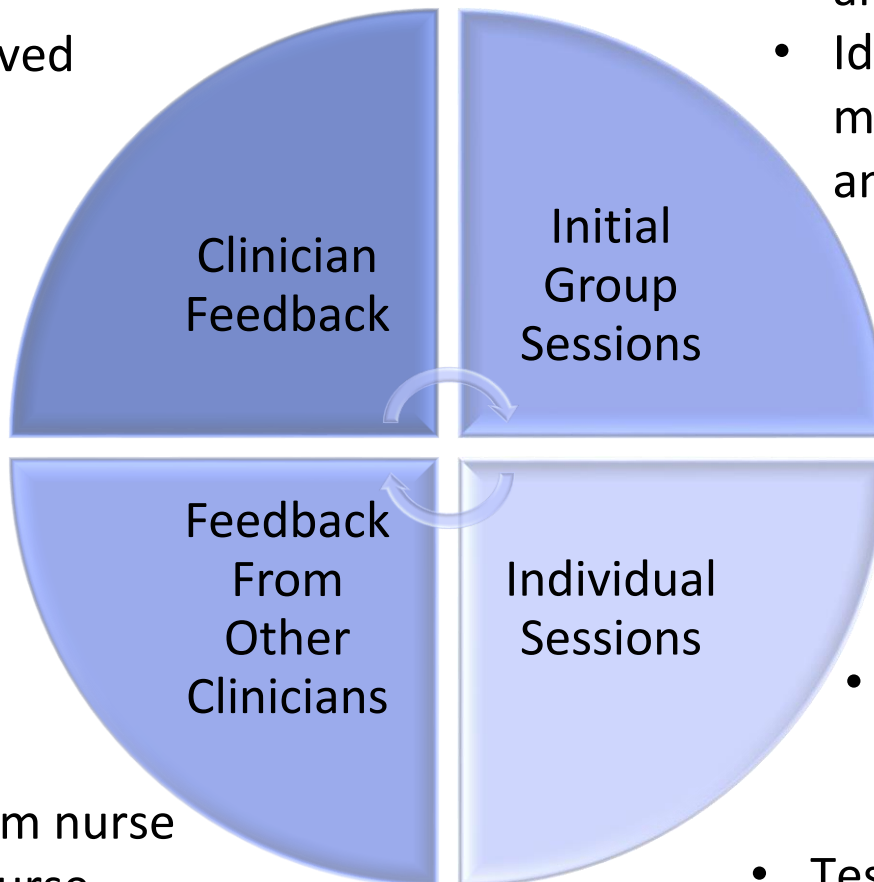
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- Examine the usability of an original and optimized navigator in the ambulatory setting.
- Determine if using the redesigned navigator had a positive impact on clinicians' ability to complete MU tasks.



# The Redesign Process

- Directly involved in design and testing.



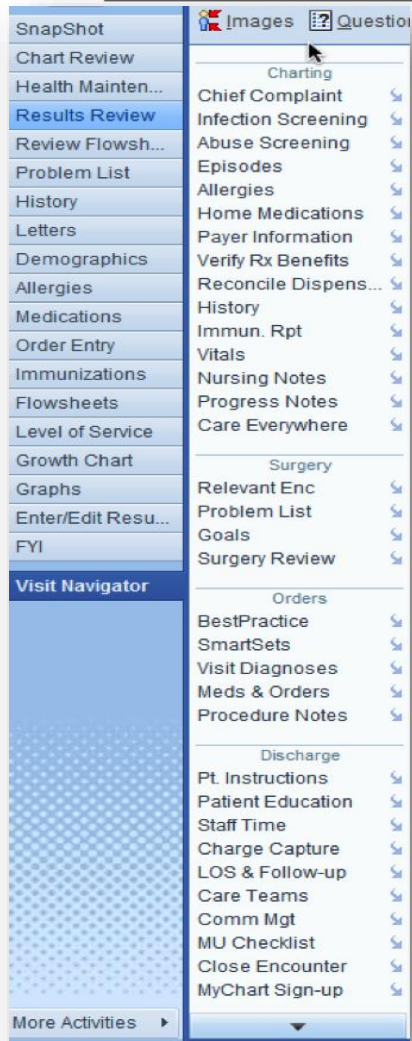
- Multiple specialty providers and informatician.
- Identified key tasks by role most important for ambulatory care.

- Clinicians met with developers individually over several weeks.
- Tested different iterations of the navigator.

- Input sought from nurse managers and nurse assistants.



# “Old” Navigator



- Opened by clicking button labeled visit navigator
- Also the default screen shown when opening a patient's chart
- Consisted of column of items divided into domains
  - Sample items: chief complaint, meds, and orders
- Additional options available in column at left



# “New” Navigator

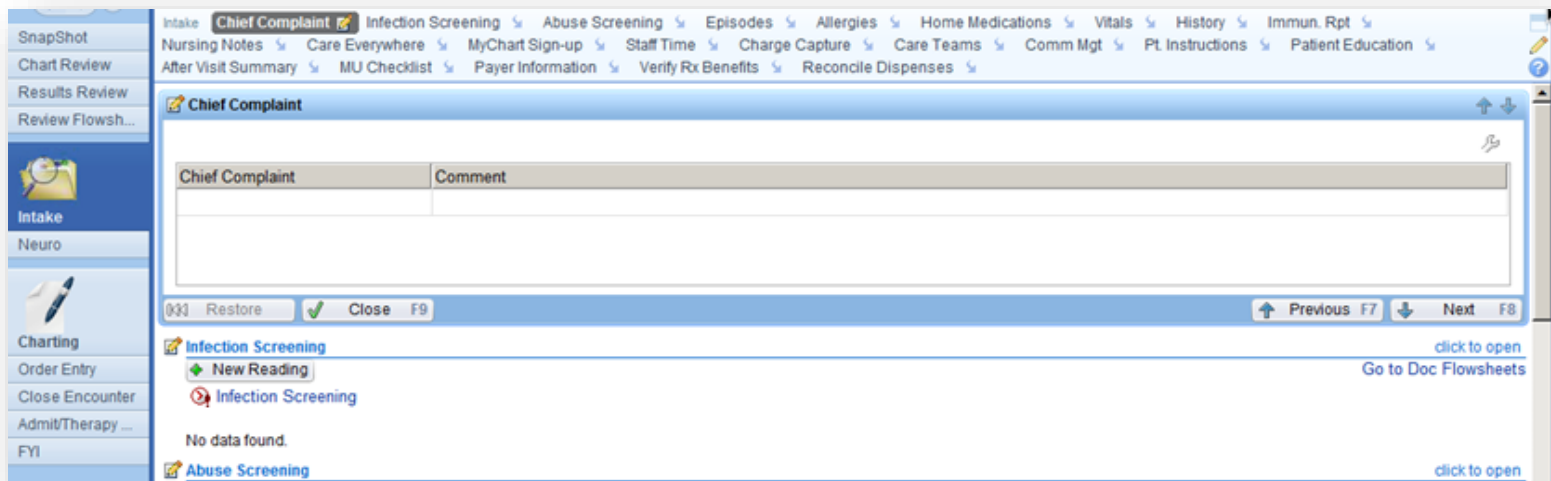


Figure 2: Screenshot of a portion of the original ambulatory navigator (© 2015 Epic Systems Corporation. Used with permission).

- “Intake” button and “charting” buttons instead of “visit navigator” button
  - “Intake” options intended for use by rooming staff
  - “Charting” options intended for use by clinicians
- Options displayed at the top instead of along the side
- Left-hand column options reduced

# Participants and Setting

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- Convenience sample (n=8) of resident physicians in 2<sup>nd</sup> to 4<sup>th</sup> year of training.
- Residents were experienced users of the inpatient setting of the EHR.
- Were naive users not familiar with this ambulatory navigator.
  - Unfamiliar with both versions



# Procedure – Part 1

## Complete Sets of Tasks

- Based on MU stage 2 criteria using different test patients in a training environment of the EHR.
- Patient cases were reviewed to ensure similar levels of complexity.
- Sets of tasks were reviewed and tested to ensure similar level of difficulty.

## Each Participant 2 Cases

- Using the original navigator.
- New cases using the new navigator.
- One case in each navigator.

## Randomization

- Order of cases and navigators was randomized.

### Example Tasks:

- Enter a chief complaint.
- Prescribe a medication and associate it with a diagnosis.
- Review past medical history.

# Procedure – Part 2

## Think Aloud Procedure

- Participants verbalized thoughts using a “think aloud” procedure during each patient case.

## Single Ease Question

- After each case, participants completed a single ease question.

## System Usability Survey

- After each navigator, participants completed the system usability survey (SUS).

## Final Survey

- Participants completed a final survey with demographic questions and feedback about the cases, the navigators, and the overall experience.



# Analysis

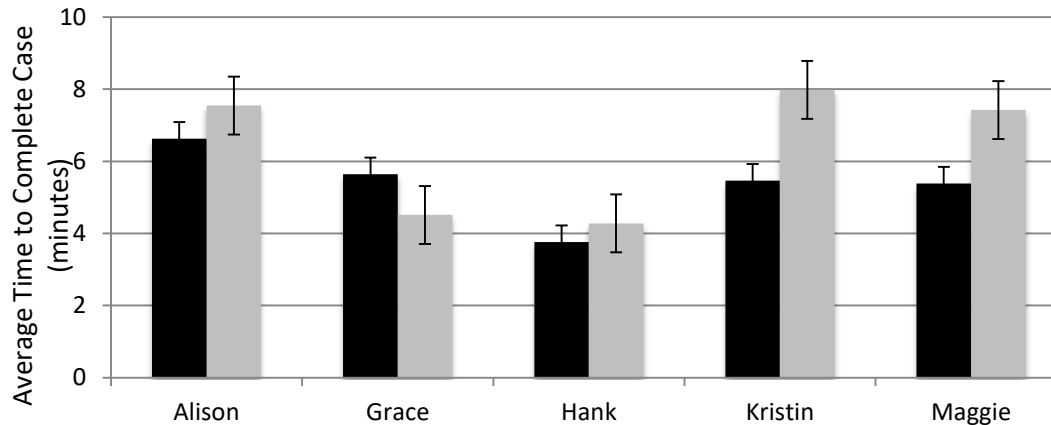
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- Quantitative
  - Time to complete case
  - Perceived complexity
  - Perceived usability
- Navigation pathway
  - Examined the pathways and button clicks participants took to locate areas of the EHR to perform the tasks.
- Qualitative
  - Session recordings were reviewed and coded for themes.

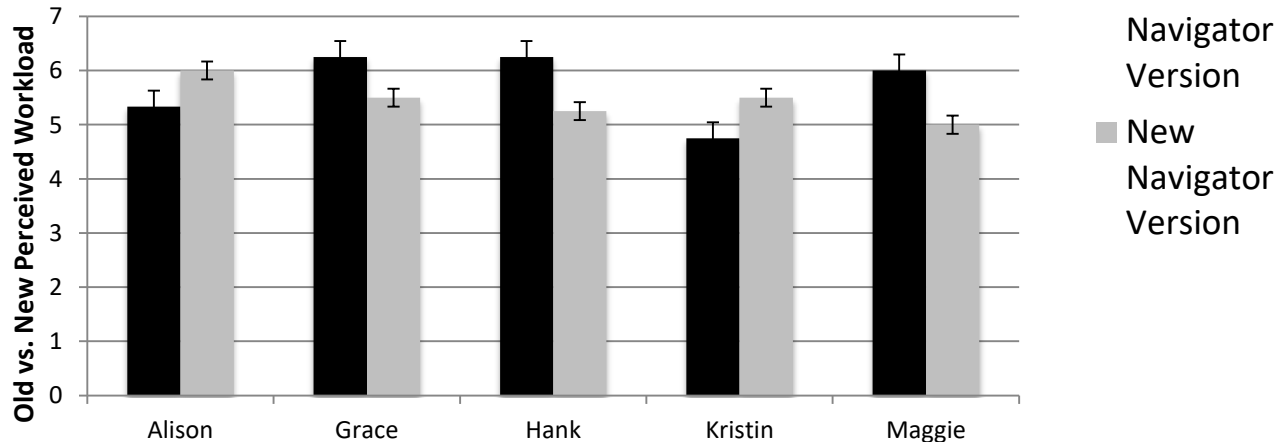


# Results: Time to Task and Perceived Workload

## Old vs. New Time to Complete Patient Case



## Old vs. New Perceived Workload



# Qualitative Analysis: Themes

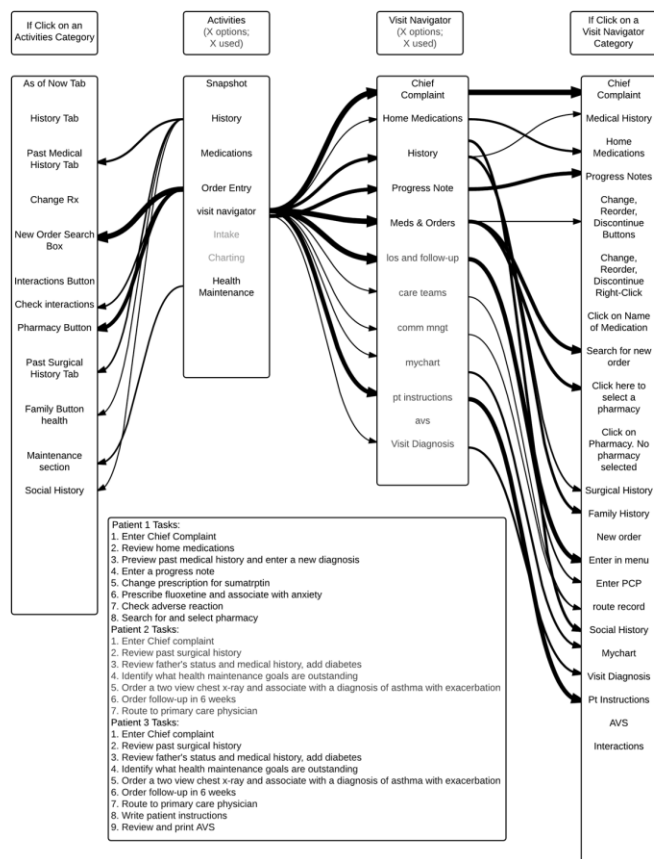
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- All participants encountered problems and experienced confusion.
- Preferences varied widely between the two navigators.
  - Links on top vs. side
  - Scrolling through a long list but having all the options in one spot vs. having a short list of options but having to search around for additional items
- The separate menus for “intake” and “charting” introduced confusion in the new navigator.

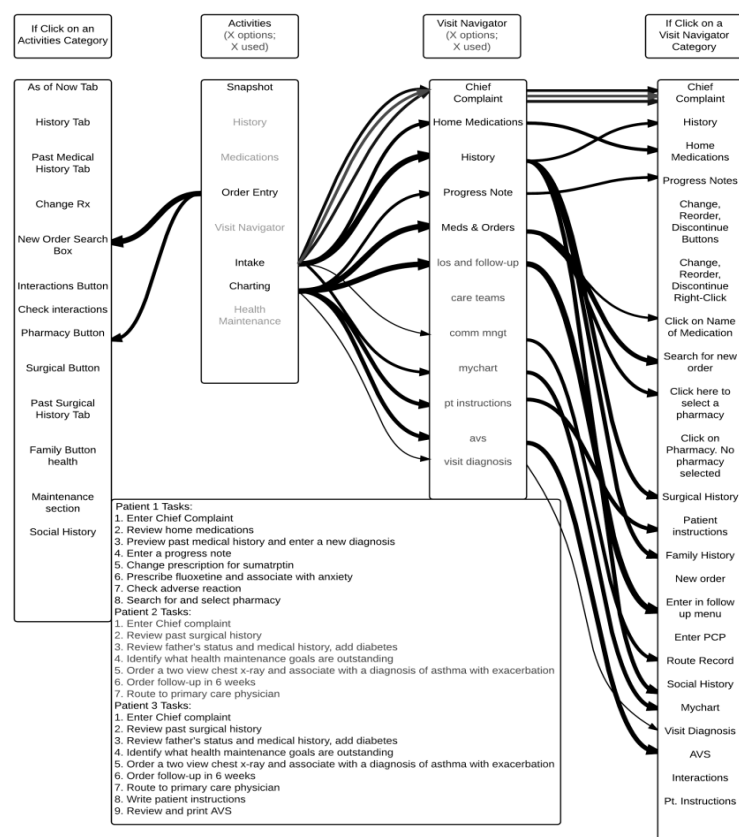


# Pathway Analysis

## Old Navigator Pathways



## New Navigator Pathways



# Pathway Analysis

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- Many different pathways available, even for simple tasks
  - Participants use many different pathways based on preferences.
  - Options were available to participants that they did not use.
  - Participants used unanticipated pathways or “workarounds.”
    - Using the search function
    - Searching the “more activities” list
- High-level navigation patterns different depending on navigator
  - In “old navigator,” participants used options in left-hand column.
  - In “new navigator,” some options were removed and participants were forced to use other pathways.

# Discussion

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- User-centered design of navigators is important.
  - Impacted ability to perform tasks
  - Influenced navigation patterns and overall experience
- Tension between flexibility and standard workflow.
- Confusion was common, regardless of navigator.
  - All participants experienced struggles while completing tasks, even when they reported that the task was easy.
  - Indicates that training with standardization of workflow may be beneficial.





# Limitations and Next Steps

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- Limitations
  - Small sample size with only resident physicians at single institution
  - Study conducted in a laboratory setting
- Next steps
  - Training component
  - Examine with other user groups in more naturalistic conditions

# Takeaways

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- User-centered design is important but insufficient when designing EHR functionality and associated workflows.
- Flexibility in EHRs creates confusion.
  - Must be balanced with standard workflows.
  - Training to workflow and not functionality may provide a bridge.



# “When, Why, and How Physicians Optimally Read Electronic Progress Notes: A Mixed-Methods Evaluation”

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## In review

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No disclosures

# Background

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- Progress notes
  - Key for communication about and synthesis of patients
  - Typically follow SOAP format (Subjective, Objective, Assessment, Plan)
  - Established by Dr. Lawrence Weed in the 1960s as part of the Problem Oriented Medical Record (POMR) framework
- Electronic progress notes
  - Longer than paper notes and time consuming to create
  - Often contain extraneous or inaccurate information
  - Assessment and plan (A/P) section considered most valuable but at end of a note requiring scrolling to locate
- Unclear how to make the most vital information in notes available and easy to find

# Rationale & Objectives

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**Rationale:** Challenges with electronic progress notes point to an existing need to improve physicians' experience using clinical notes.

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Some have suggested that the A/P sections should be moved to the top of the note (including writing in APSO format).

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**Study Objective:** Gain insight into when, why, and how clinicians read electronic progress notes.

# Participants and Setting

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- EHR system prototype designed to look like CPRS/VistA
  - Office setting using a desktop computer
  - TURF software used to record the sessions
- Convenience sample of 23 mid-level residents

# Patient Case Design

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- 4 de-identified patient cases
  - Designed to be realistic and of similar complexity.
  - 9 progress notes per case.
  - Patient cases presented in the same order.
- Notes formatted in four orders
  - 1. SOAP
  - 2. APSO
  - 3. SAPO
  - 4. Mixed (3 SOAP, 3 APSO, and 3 SAPO)
- Note format randomized Latin Squares design
  - All participants saw all 4 note formats.



# Methods

## Prototype EHR opened to notes section

For each patient case, participants:

Reviewed the case as they normally would

Provided a verbal summary of the case

Filled out NASA-TLX workload instrument



After completing all four cases, participants:

Completed an exit interview

Completed an exit questionnaire

## Mixed Methods Analysis

Actual note reading patterns

- Experimental data
- Scrolling analysis

Perceived note reading patterns

- Interview data
- Questionnaire data



# Perceived Patterns: Interviews

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- Start reading a patient note at either the Subjective or the Assessment and Plan sections.
  - *“Typically, when assessing a patient note for any given specialty, I’ll look at their HPI or initial subjective assessment, then go and jump to the assessment and plan.”*
  - *“If I’m looking at a specific clinical note, a lot of the time I’ll look for the assessment and plan first, and then kind of see how they came to that conclusion by reviewing their history and then other things.”*

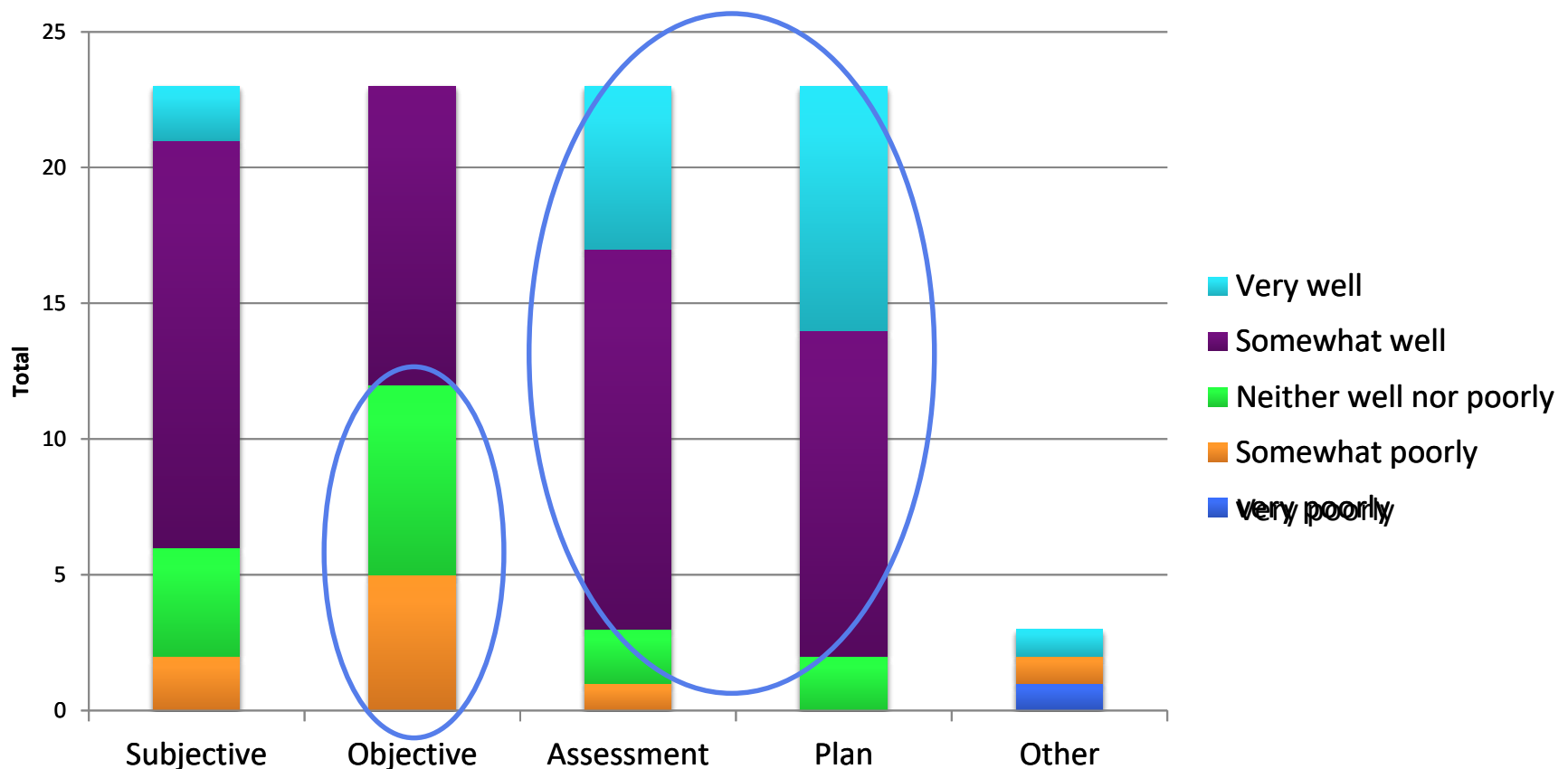
# Perceived Patterns: Interviews

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- Skip a variety of information, including:
  - Past medical history, past surgical history, vitals, labs, medications, review of systems, imaging, exam, physical findings, and generally anything that looks auto-populated.
- Frustration with auto-populated data and “note bloat”
  - *“How they auto-populate different things like the medications that sometimes, the redundancies in that, they sometimes decrease efficiency.”*

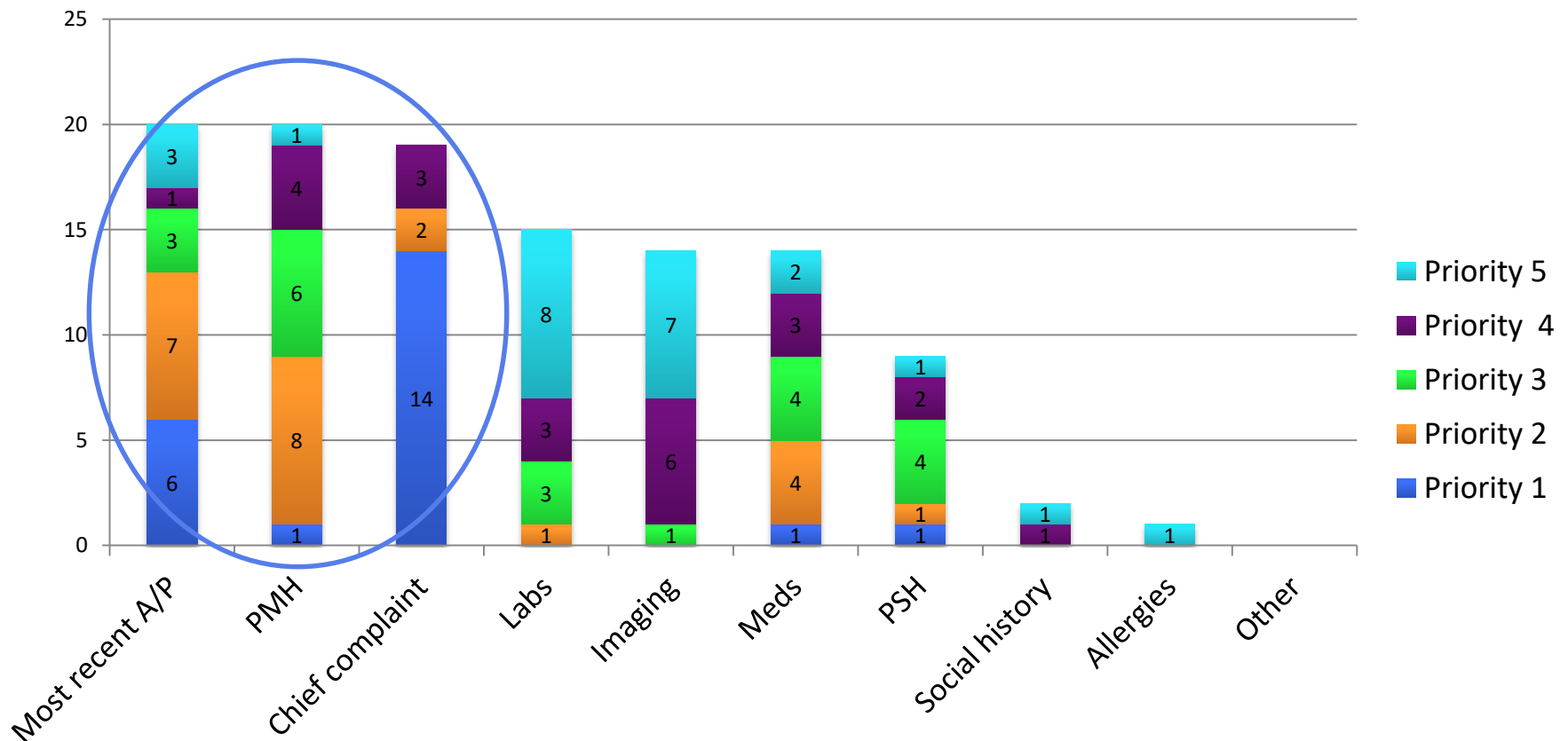
# Perceptions on Progress Note Section Importance

How well does each section provide information you need?



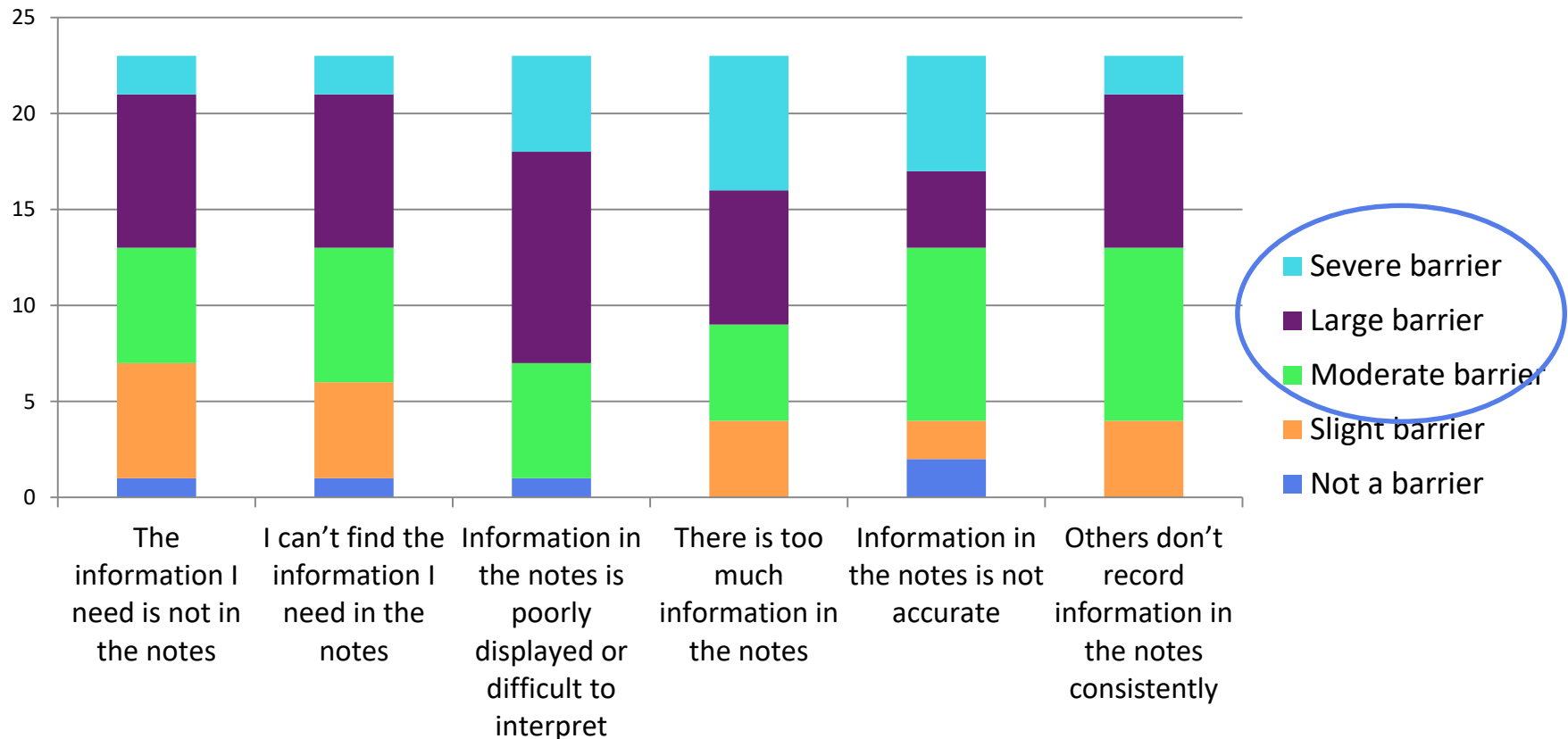
# Perceptions on Other Sections With Valuable Information

What types of information are most valuable?



# Self-Reported Information Barriers

How severe are different information barriers?





# Experiment Note Reading Patterns

Note Order	Reading Time in Minutes (stdev)	Verbal Summary Time in Minutes (stdev)	Average Workload Score (stdev)	Proportion Scrolling
SOAP	11.6 (4.95)	2.1 (1.66)	30.6 (10.57)	61%
APSO	10.6 (1.85)	1.9 (1.49)	31.3 (8.75)	60%
SAPO	11.3 (2.29)	2.3 (1.62)	31.9 (7.04)	57%
Mix	12.5 (2.12)	2.1 (1.04)	31.7 (7.78)	59%
Average	11.5 (2.08)	2.1 (1.46)	31.4 (8.52)	59%

# Key Experiment Findings

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- Significant difference in time to review
  - APSO took the least time.
  - Mixed took the most time.
- No significant difference in time to summarize cases
- No significant difference in workload score between orders
  - SOAP notes had lowest workload score.

# Discussion

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A/P were  
highly  
valued.

Participants often read these sections first.

Almost all participants rated these sections as providing information they needed either Very Well or Somewhat Well.

Most recent Assessment and Plan rated as one of the most valuable sections.

Participants  
stated  
many  
problems  
with notes.

Most participants rated all information barriers as either Moderate, Large, or Severe barriers.

Negative impacts of auto-populated data and “note bloat” – including ignoring data.





# Discussion

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- Should notes be reordered?
  - Mixed note formats took participants longest to read.
    - Now common because of customized note templates.
    - Separate note creation format from note reading format?
  - APSO notes were read most quickly.
    - But was that because information at the end of the note was ignored?
    - Followup eye-tracker analysis.
- No significant impact on perceived workload and time to summarize cases.

# Acknowledgements

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- Thank you!



# Contact Information

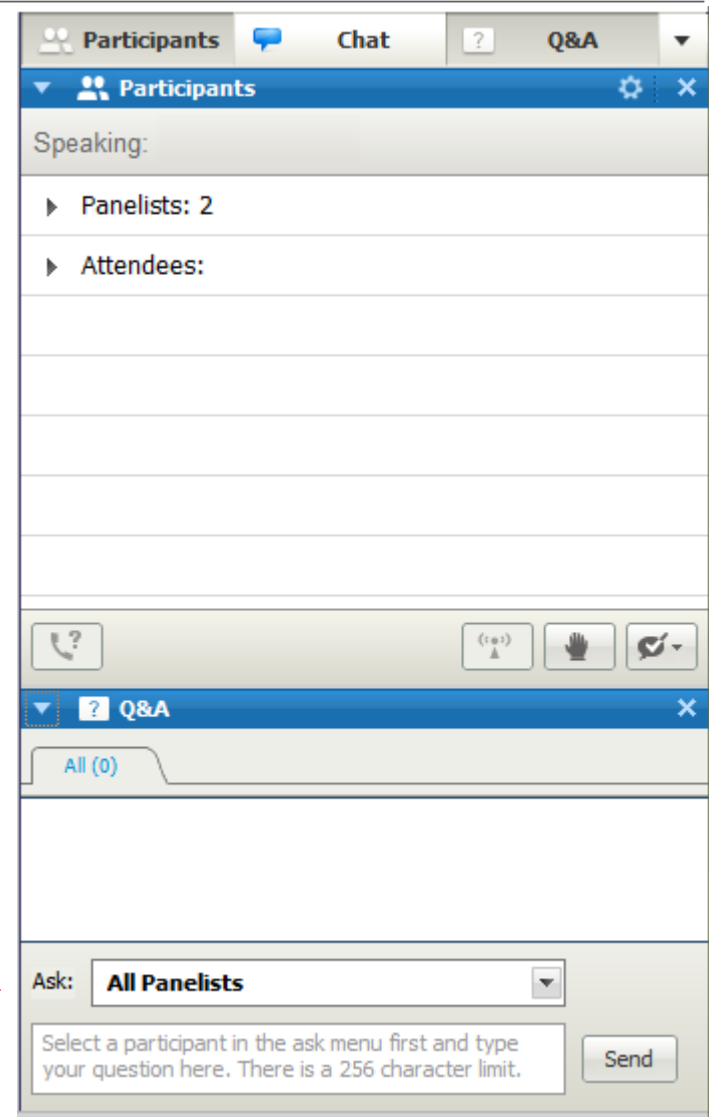
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